

Assessing the Economic Value of a Regional Air Quality Plan

E. Angelino¹, C. Carnevale², R. Gianfreda³, G. Guariso⁴, G. Lanzani¹, G. Maffei³, E. Turrini²,
M. Volta²

¹ARPA Lombardia, Milano, Italy, e.angelino;g.lanzani@arpalombardia.it

²DIMI, University of Brescia, Italy, claudio.carnevale;enrico.turrini;marialuisa.volta@unibs.it

⁴Terraria Srl, Milano, Italy, r.gianfreda;g.maffei@terraria.com

³DEIB, Politecnico di Milano, Italy, giorgio.guariso@polimi.it

Abstract

When developing an air quality plan, environmental authorities usually devise a number of individual actions, constituted by the application of both technical (end-of-pipe) and energy efficiency measures. They may range from the incentives to buy less polluting vehicles, to the enforcement of stricter rules on domestic heating. The assessment of the economic effectiveness for the society as a whole of the individual measures and of the overall plan requires a flexible support system able to quickly perform air quality impact evaluations on the specific area. One such system is RIAT+, a software package developed and tested during a series of European research projects, which has been used to evaluate costs and benefits of the Lombardy Region Air Quality Plan (PRIA), constituted by about 90 different actions to be implemented within 2020. The adoption of each measure means a certain change in the emission, which is distributed over the regional territory in different way, depending on the type of measure. A shift of the car fleet to a different EURO class, for instance, means an emission reduction only on the road network, while a reduced use of electricity may imply a lower emission of power plants at specific sites.

To evaluate the effects of these emission changes, RIAT+ adopts a surrogate model approach, namely using a neural network calibrated on few results of a full chemical transport model. It is thus possible to rapidly evaluate the improvements in the population exposure and health and the consequent reduction of external costs.

The final economic assessment is obtained by comparing the sum of energy savings and external cost reductions with the implementation costs of the corresponding measures.